Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Programme: Electronics and Telecommunication Engineering

Syllabus for
Final Year of B. Tech

Programme Educational Objectives (PEOs):

1. To motivate the students for pursuing higher education from renowned organizations, leading to Research & Development in core technical area.
2. To encourage students to participate in Social activities & utilize engineering knowledge to fulfil socio-ethical problems for Rural development & Regional needs of technology.
3. To prepare students with core Technical competency, Soft skills, Leadership quality & demonstrate an ability to work in multi-disciplinary fields.
4. To be able to acquire state of art knowledge to cater the Industry employability needs & to motivate students to enter in the field of Entrepreneurship.

Programme Outcomes (POs):

PO	Nomenclature	Definition (After successful completion of Electronics and Telecommunication Engineering program, student will able to:)
PO1	a	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	b	**Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	c	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	d	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	e	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	f	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	g	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	h	**Ethics:** Apply ethical principles and commit to professional ethics and

		responsibilities and norms of the engineering practice.
PO9	i	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	j	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	k	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	l	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs):

PSO	Nomenclature	Definition
PSO1	m	A student should be able to demonstrate skills in analyzing and debugging any malfunctioning or errors of a pre-existing electronic/computer hardware or software systems for employability in core/IT sector.
PSO2	n	Design, Simulate and develop computer based prototype system for applications including Signal processing, Communication, Computer networks with free ware open source software platforms.

Government College of Engineering Karad
Final Year B. Tech
EX1701: Wireless and Mobile Communication

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Focus on basic fundamentals of wireless communication
2. Explain large &small-scale radio wave propagation
3. Understand the system design fundamentals of cellular system
4. Understand basic mobile communication and its multiple access techniques.

Course Contents

		Hours
Unit I	**Introduction to wireless communication** Evolution of wireless communication systems, Examples of wireless communication systems.	6
Unit II	**The cellular concept – system design fundamentals** Concept of frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems.	8
Unit III	**Propagation models** Free space propagation model, Two-ray ground reflection model, Distance power loss, Macro-cell propagation model, Micro-cell propagation model, Shadowing model, Multipath effects in mobile communication, Models for multipath reception.	8
Unit IV	**Equalization, diversity and channel coding** Fundamentals of equalization, Adaptive equalizers, Linear and nonlinear equalization, Algorithms for adaptive equalization, Diversity techniques, Fundamentals of channel coding, Overview of error detection and correction codes.	8
Unit V	**Multiple access techniques** Introduction to multiple access, Frequency division multiple access (FDMA), Time division multiple access (TDMA), Spread spectrum multiple access, Space division multiple access (SDMA),Codedivision multiple access (CDMA) ,Packet radio,	8

Orthogonal frequency divisionmultiple access (OFDM)

Unit VI **Wireless LAN**

Introduction, Infrared radio transmission infrastructure and adhoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 List basic fundamentals of wireless communication
2 Design a mobile network
3 Analyse large &small-scale radio wave propagation
4 Apply multiple access techniques to mobile communication.

Text Books

1 Theodore S. Rappaport,"Wireless Communications: Principles and Practice", Pearson / PHI Publication, 2nd Edition, 2002.

References

1 William C. Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", Tata McGraw Hill Publication, 2nd Edition, 1995.
2 Dr. Kamilo Feher, "Wireless and Digital Communications", PHI Publication, 1st Edition, 1995.

Useful Links

1 https://www.youtube.com/watch?v=CUyF0YGIA5Y&list=PL1A4AFAC7AC1909C9
2 https://www.youtube.com/watch?v=CUyF0YGIA5Y&list=PL3607D4A9E70266F9

Mapping of CO and PO

	PO												PSO	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√				√	√	√				√	√		
CO2	√	√	√	√	√	√	√			√	√	√		
CO3	√	√	√	√	√					√		√	√	√
CO4	√	√	√	√	√					√		√		

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create	√			√
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1702: VLSI Technology

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Impart the fundamentals of HDL (VHDL and Verilog).
2. Study Digital System Modelling using Verilog.
3. Impart the knowledge of PLDs.
4. Develop knowledge of testing of Digital Systems.

Course Contents

		Hours
Unit I	**Introduction to HDL** Importance of CAD tools, emergence of HDL, Fundamentals of VHDL and Verilog including language basics to circuit implementation.	6
Unit II	**Combinational Circuits design using Verilog** Design of Combinational Circuits like Adder, Subtractor, Multiplexer, Demultiplexer, Encoder, Decoder, Tri-state Buffer, Parity checker, ALU, Barrel Shifter	6
Unit III	**Sequential Circuits design using Verilog** Design of Sequential circuits like Flip-Flops, Counter, FSM, Melay and Moore Machine, Sequence Detector, LFSR	8
Unit IV	**Introduction to PLDs** Importance of Programmable ICs, ROM, PLA, PAL, CPLD and FPGA	6
Unit V	**Testing of Digital Designs** Fault models, path sensitization, random test, design for testability, Built - in self-test and Boundary scan.	6
Unit VI	**MOS Transistor theory** Physical structure of MOS transistor, MOS transistor under static conditions,Introduction to CMOS inverter and its V-I characteristics.	8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Understand the fundamentals of HDL.
2 Analyze, design and simulate Digital Systems.
3 Implement Digital systems on PLDs
4 Understand the Testing of Digital Designs

Text Books

1 J.F. Wakerly, "Digital Design: Principles and Practices", Prentice Hall, 4th Edition, 2008.
2 Samir Palnitkar, "Verilog HDL, a guide to digital design and synthesis", Prentice Hall, 2nd Edition, 2003.
3 ZainalabedinNavabi, "Verilog Digital System Design", Mc-Graw Hill, 2nd Edition, 2006.

References

1 T. R Padmanabhan, B. Bala Tripura Sundari, "Design Through Verilog HDL", Wiley Publications, Student Edition, 2008.
2 Dr. KVKK Prasad, KattulaShyamala, "VLSI Design- Black Book", Wiley-Dreamtech Press.
3 NazeihBotros, "HDL Programming Fundamentals", Da Vinci Engg. Press, 2006.

Useful Links

1 www.xilinx.com
2 nptel.ac.in/courses/106105083/3
3 nptel.ac.in/courses/117108040

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1		√											√	
CO2	√	√	√		√									√
CO3			√		√						√		√	√
CO4	√		√										√	

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√	√	√	√
Understand			√	√
Apply	√	√		√
Analyze	√			√
Evaluate				√
Create		√		√
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1703: Fiber Optics

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Understand Optical fiber structure and light propagating mechanisms in detail
2. Analyse the signal degradation mechanisms and the methods of limiting the same
3. Explain the construction and working of optical sources and detectors
4. Describe the fiber optics link design and optical network in fiber

Course Contents

		Hours
Unit I	**Basic Optics** Introduction, Plane Polarized waves, circularly and elliptically polarized waves, propagation of a light wave through a quarter wave plate, reflection at a plane interface, two beam interferences, concept of coherence, Diffraction of Gaussian beam, Treatment with ray optics, treatment with wave optics	7
Unit II	**Fiber Technology** Manufacturing and mechanical properties, Fiber characteristics: Loss, Dispersion, Optical Time Domain Reflectometry (OTDR), Components: cable structure, couplers, optical amplifiers, light sources, Optical Receivers	7
Unit III	**Nonlinear phenomenon in fiber** Nonlinearity in fiber vs. in bulk, Kerr nonlinearity, Nonlinear Wave Equations, Normal Dispersion, Anomalous Dispersion	6
Unit IV	**Optical Link Design & Modulation** Nonlinear effects in fiber optic links, Optical amplifier, optical SNR, digital &analog fiber optic links, free space optical links, fiber optic LAN, Optical signal processing, Performance measurement and monitoring,	8
Unit V	**Optical Networks** WDM concepts and Components, SONET/SDH, High speed Light wave links, optical switching, WDM Network examples, Wavelength	8

Routed Networks, Nonlinear Effects on Network Performance, Performance of WDM+EDFA Systems, optical CDMA

Unit VI **Technological Applications of Optical fiber**

Fundamentals of Radio System Engineering, Nonlinear Transmission, Technical Issues 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1. Analyse the basics of Fiber Optics
2. Synthesize the different types of optical fiber structures and light propagating mechanisms.
3. Evaluate the construction of and working of optical sources and detectors
4. Design of optical fiber link & Budget, WDM and optical network in detail

Text Books

1. AjoyGhatak and K.Thayagarajan, "An Introduction to Fiber Optics", Cambridge University Press, 1st Edition, 1998
2. FedorMitschke, "Fiber Optics: Physics and Technology", Springer, 2nd Edition, 2016
3. Jeff Hecht, "Understanding Fiber Optics", Laser Light Press, 5th Edition, 2015

References

1. J. Keiser, "Fiber Optic communication", McGraw-Hill, 2nd Edition
2. Jhon Senior, "Optical Fiber Communications-Principles & Practices", PHI, 2nd Edition
3. Agrawal, "Fiber optic Communication Systems", John Wiley and sons, 1992
4. J. Gowar, "Optical communication systems", Prentice Hall India
5. Ramaswamy," Optical Networks",ELSEVIERINDIA

Useful Links

1. http://nptel.ac.in/courses/117101002/
2. http://nptel.ac.in/courses/117101054/

Mapping of CO and PO

	PO												PSO	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√	√		√	√	√	√			√				
CO2	√		√		√	√				√			√	
CO3	√	√			√			√		√	√		√	
CO4	√	√	√	√			√		√	√				√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX 1704: Computer Communication Networks

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Provide an introduction to networking concepts, topologies
2. Explain various transmission media and devices
3. Elaborate concepts of layers of OSI model
4. Describe various routing algorithm and congestion control mechanism

Course Contents

		Hours
Unit I	**Introduction to Data Communication** Goals and Applications of Networks, Wireless Network, Interfaces and services. Reference Models: The OSI reference model, TCP/IP reference model.	6
Unit II	**Physical Layer** Data and Signals, Digital and Analog transmission, Transmission Media, guided and unguided transmission, **network topologies**: star, bus, mesh, ring, , EIA-232 standard, **network devices**: NIC, hub, switch, routers, bridge, modem types	8
Unit III	**Data Link Layer** Data link layer design issues, Services provided to Network layers, Framing, Error control, Flow control, Error detection and correction, Elementary data link protocols, An unrestricted Simplex protocol, A Simplex Stop-and-Wait protocol, Simplex Protocol for a noisy channel, Sliding Window protocols, A protocol using go-back-N, A protocol using selective repeat, Example data link protocol-HDLC, PPP.	8
Unit IV	**Medium Access Sublayer** Channel Allocations, Random Access, ALOHA, Carrier Sense Multiple Access Protocols, Collision free Protocols, Limited contention protocols, Controlled Access, Channelization, Wired LANs: Ethernet, Wireless LANs.	6
Unit V	**Network Layer**	

Network Layer Design issue, Logical Addressing, Address Mapping, Error Reporting and Multicasting, Delivery Forwarding and Routing. 6

Unit VI **Transport and application layer**

Process to Process Delivery: UDP, TCP and SCTP. Design issues of the application layer, Domain Name systems, File Transfer, http, web documents, Virtual Terminals. 6

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Describe and differentiate various types of networks and network topologies
2 Explain and distinguish between OSI and TCP/IP models
3 Explain error detection and correction mechanism and frame formats
4 Explain various routing algorithms and congestion control mechanism

Text Books

1 B. A. Forouzon "Data Communication and Networking, Mc Graw Hill, 4th Edition, 2007.
2 W. Stallings, "Data and computer communication", PHI, 7th Edition, 2004.

References

1 S. Keshav, "An Engineering Approach on Computer Networking", Addison Welsey, 1st Edition, 1997.
2 Wayne Tomasi "Introduction to Data Communications and Networking" Pearson Prentice Hall, 1st Edition,2005.
3 A.S. Tanenbaum, "Computer Networks", PHI, 4th Edition, 2013.

Mapping of CO and PO

	PO												PSO	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√	√	√		√					√	√	√		
CO2	√		√		√							√		
CO3	√	√	√	√	√							√	√	√
CO4	√	√	√	√								√	√	√

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1715: Mechatronics

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/ week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Course Objectives

The student should be able to:

1. Impart the knowledge of Mechanical operations & Processes
2. Study actuators and their suitability for applications.
3. Understand PLC & its applications.
4. Understand CNC& its applications.

Course Contents

		Hours
Unit I	**Overview of Mechatronics** Introduction to Mechatronics, design of process, systems, measurement ofsystem, Control system, Process Controllers, Programmable logic controllers.	8
Unit II	**Process Controllers** Controller Principles, Two position controller(ON/OFF controller), Proportional controller,Integral controller, Derivative controller, Pneumatic controllers,PID controller tuning.	8
Unit III	**Actuators and Mechanical Elements in Mechatronics** Types of actuators, Electromechanical Actuators, DC motor, AC motor, Piezoelectric Actuators, Chemical Actuator, Bearings and Bushings, Belts and Pulleys, Brakes and clutches, Chains and Sprockets, Couplings and joints, gears, Pulleys and Belts, Solenoids, springs, Switches.	8
Unit IV	**Programmable Logic Controllers** Introduction to PLC, Basic structure of a PLC, Principle of Operation, PLCs versus computer, PLC programming.	8
Unit V	**Introduction to CNC machines** CNC machines, NC machines, CNC machines, DNC machines, machine structure, Robotics.	8
Unit VI	**Study of Mechatronics Systems** Study of systems used in Ink Jet Printers, Photo copying, Washing Machines. IC Engine fuel injection system etc.	8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Understand the fundamentals of Mechatronics.
2 Demonstrate how Mechatronics integrates knowledge from different disciplines.
3 Design actuators according to the need of application.
4 Demonstrate PLC and CNC operations.

Text Books

1 W Bolton,"Mechatronics", Pearson Publication, 4th Edition, 2011.
2 Reis Webb, "Programmable logical controller: Principles and Applications", Prentice Hall Publication, 1ST Edition, 2003.
3 Appu Kuttam, "Mechatronics", Oxford publications, 1st Edition, 2007.

References

1 K.P Ramachandan,G.KVijayaraghavan, "Mechatronics Integrated mechanical electronic system",Willey India Publication, 1st Edition, 2008.
2 Singh M. D., Joshi J. G., "Mechatronics ", Prentice-Hall of India Pvt. Ltd, 1st Edition, 2006.
3 Ganesh S. Hegde, "Mechatronics", Jones & Bartlett Learning, 1st Edition, 2010.

Useful Links

1 http://nptel.ac.in/courses/112103174/

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CO1		√	√										√	
CO2	√	√			√									√
CO3			√								√		√	√
CO4	√		√		√								√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand			√	√
Apply	√	√		√
Analyze	√			√
Evaluate				√
Create		√		√
Total	**15**	**15**	**10**	**60**

Government College of Engineering Karad
Final Year B. Tech
EX1725: Real Time Operating Systems

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Characterise real-time systems and describe their functions.
2. Analyse, design and implement a real-time system.
3. Apply formal methods to analysis and design of real time systems.
4. Characterise and debug a real-time system.

Course Contents

		Hours
Unit I	Introduction – Issues in Real Time Computing, Structure of a Real Time System, Task classes, Performance Measures for Real Time Systems, Estimating Program Run Times. Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms, Uniprocessor scheduling of IRIS tasks, Task assignment, Mode changes, and Fault Tolerant Scheduling.	8
Unit II	PROGRAMMING LANGUAGES and Tools – Desired language characteristics, Commonly Used languages, Run time Support, Complier optimization	8
Unit III	Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Data bases for Hard Real Time Systems.	8
Unit IV	Real-Time Communication – Communications media, Network Topologies Protocols, Fault Tolerant Routing.	8
Unit V	Fault Tolerance Techniques – Fault Types, Fault Detection. Fault Error containment - Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.	8
Unit VI	Evaluation Techniques – Obtaining parameter values, Reliability	8

models for Hardware Redundancy, Software error models.

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 To present the mathematical model of the system.

2 To develop real-time algorithm for task scheduling.

3 To understand the working of real-time operating systems and real-time database.

4 To work on design and development of protocols related to real-time communication.

Text Books

1 C.M. Krishna, Kang G. Shin, "Real Time Systems", McGraw – Hill International, 1stEditions, 2010.

2 Jane w.s.liu, "Real-Time Systems", Prentice Hall, 1st Edition, 2010.

References

1 Jonathan W. Valvano,"Embedded Systems: Real-Time Operating Systems for the Arm Cortex-M3", CreateSpace Independent Publishing Platform, 2012

2 Hermann Kopetz, "Real-Time Systems: Design Principles for Distributed Embedded Applications (Real-Time Systems Series)", Springer, 2nd Edition.

Useful Links

1 IEEE Technical Committee on Real-time systems

2 Ada'95 Reference Manual

3 https://www.youtube.com/watch?v=9G9vEjrXDvE&list=PL21A10EEE45BD6BAF

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√	√	√	√		√			√		√		√	√
CO2	√	√	√	√	√				√	√				√
CO3	√		√		√				√			√	√	
CO4	√	√	√	√	√	√	√	√	√	√	√		√	√

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√			√
Understand	√			√
Apply	√	√	√	√
Analyze		√	√	√
Evaluate		√	√	√
Create		√	√	√
Total	**15**	**15**	**10**	**60**

Government College of Engineering Karad
Final Year B. Tech
EX1735: Industrial Drives

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60

Duration of ESE: 2 Hrs 30 min

Course Objectives:

The student should be able to:

1. Describe the structure of Industrial Drive systems and their role in various applications
2. Study and understand the operation of electric motor drives
3. study and understand the operation of both special and modern induction motor drives
4. Understand the basic principles of power electronics in drives and its control

Course Contents

		Hours
Unit I	**Introduction to Electrical Drives** Introduction, Need for Drive, Types of Drive, Concept of Electric Drive, Trends in Drive Technology, Classification of Drives	8
Unit II	**DC Drives** Controlled Rectifier fed DC Drives, Single phase Drives for separately excited DC Shunt motor, three phase Drives for separately excited DC Shunt motor, Effect of DC Drives on Power Quality, chopper fed DC drives, comparison of converter fed drive and chopper fed drive	8
Unit III	**AC Drives** Introduction to AC motor drive, control techniques of power-electronic drives, microcontroller and DSP based drives, introduction to artificial intelligence based drives, protection and fault diagnosis of solid state AC drives, Variable frequency Square wave VSI Drives, Variable frequency PWM VSI Drives, Variable frequency PWM CSI Drives	8
Unit IV	**Special Motor Drives** Cylindrical rotor motor Drive, Salient pole motor Drive, switched reluctance motor (SRM) drive, Synchronous Reluctance motor drive, self-controlled synchronous motor drives, Stepper motor drives, Servo motor Drives, vector controlled synchronous motor drives	8
Unit V	**Drive Applications in Renewable Energy** Wind power system: System component, Turbine rating, Electrical	8

load matching, fixed speed and variable speed operation, System design features, role of power electronics in WECS, Drive selection criteria for fixed speed and variable speed WECS, Basics of Photovoltaic, Power Electronics for Photovoltaic Power Systems, Stand-alone PV systems, Grid connected PV systems

Unit VI **Applications of Artificial neural network and fuzzy logic in Drives**

Neural network principle and applications: Introduction, Neural network in identification and control, AI Applications in electrical machines and drives, Neural network based PWM controller, Fuzzy logic Principle and applications: Introduction, Fuzzy sets, Fuzzy system, Fuzzy control, Fuzzy logic-based induction motor speed control 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Analyse AC and DC drives
2 Evaluate induction motor drive and special motor drive
3 Apply drive application in Renewable energy
4 Synthesize the application of artificial neural network and fuzzy logic in drives

Text Books

1 Sarkar B.N.," Fundamentals of Industrial Drive", PHI, 2012.
2 Tan KokKiong and Andi Sudjana Putra, "Drives and control for Industrial Automation", Springer, 2011.
3 Gopal K. Dubey," Fundamental of Electrical Drives", Narosa Publishing House, 2nd Edition, 2001.

References

1 Bimal K. Bose, "Power Electronics and AC Drives", Prentice-Hall, 1986.
2 Rashid and Khanchandani," Power Electronics", PHI Publication, 3rd Edition, 2001.
3 R.Krishnan, "Electric Motor Drives Modelling, Analysis and Control", Prentice-Hall of India Pvt. Ltd., New Delhi, 2003.

Useful Links

1 http://nptel.ac.in/courses/108108077/
2 http://nptel.ac.in/courses/108102046/
3 http://freevideolectures.com/Course/2346/Industrial-Drives-and-Power-Electronics

Mapping of CO and PO

	PO												PSO	
	a	**B**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√	√		√								√		
CO2	√	√				√		√						
CO3	√		√		√	√	√				√			√
CO4	√		√							√		√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1745: Linear Algebra

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Introduce the students to the basic techniques of Linear Algebra.
2. Perform matrix algebra, invertibility, and the transpose and understand vector algebra
3. Find basis and dimension of a vector space and understand change of basis
4. Find eigen values and eigenvectors and use them in applications

Course Contents

		Hours
Unit I	**Vector Spaces** Definition & examples of vector spaces, Vector subspaces,Bases and Dimension, Application to Matrices, Rank of a Matrix.	8
Unit II	**Linear Transformations** Basics of Linear transformations, representation of linear transformations by matrices, transpose of linear transformation.	8
Unit III	**Determinants** Determinant & its properties, computation of determinants, cofactors, Adjoint, Cramer's rule	8
Unit IV	**Diagnonalization: Eigen Values and Eigen Vectors** Polynomials of Matrices, Characteristic Polynomial, Diagonalization, Eigen values and Eigenvectors, Jordan canonical form.	8
Unit V	**Applications and Numerical Linear Algebra** Gauss-Seidel Iteration Method, Method of Least Squares, De-coupling Dynamical Systems (i.e. Solving System of Differential Equations using Diagonalization).	8
Unit VI	**Triangulation of Matrices and Linear Maps** Existence of Triangulation, Theorem of Hamilton-Cayley, Diagonalization of Unitary Maps	8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Apply Linear Algebra in their respective branches of Engineering.
2 Analyse the problem and apply the appropriate concept
3 Remember and recall the core knowledge of the syllabus
4 Creating the matrix representation of a linear transformation given bases of the relevant vector spaces.

Text Books

1 S. Kumaresan, "Linear Algebra –A Geometric Approach", PHI Learning Pvt. Ltd, 2011.
2 Hoffman and Kunze, “Linear Algebra”, Pearson Education (India),2003.

References

1 Gilbert Strang, "Linear Algebra and Its Applications", 4th edition, Thomson 2006.
2 K.B.Datta, "Matrix and Linear Algebra Aided with MATLAB", 2nd Edition, PHI Learning Pvt. Ltd., 2012.
3 Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, 2004.
4 Artin M., “Algebra”, Prentice Hall of India, 1994.

Useful Links

1 http://nptel.ac.in/courses/111106051/
2 https://onlinecourses.nptel.ac.in/noc17_ma04/preview
3 http://freevideolectures.com/Course/3382/Linear-Algebra-I/2

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√				√	√	√					√		√
CO2		√		√	√	√					√			
CO3				√							√			
CO4			√					√	√				√	√

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√		√	√
Understand	√		√	√
Apply	√	√	√	√
Analyze		√	√	√
Evaluate		√	√	√
Create			√	
Total	15	15	10	60

Government College of Engineering Karad
Third Year B. Tech
EX1706: VLSI Technology Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives:

The student should be able to:

1. Understand various modelling styles in VHDL and Verilog
2. Learn the design of Combinational and Sequential Circuits using Verilog
3. Understand the Implementation of Digital Circuits on PLDs

Course Contents

Experiment 1 Design of ALU in VHDL and Verilog using Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board.

Experiment 2 Implementation of Moore Machine in Verilogusing Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board.

Experiment 3 Implementation of Melay Machine in Verilog using Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board.

Experiment 4 Design of LFSR in Verilogusing Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board..

Experiment 5 Design of datapath unit using Verilogusing Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board..

Experiment 6 Design of Control unit in Verilogusing Xilinx ISE/ Vivado software and test its functionality on FPGA / CPLD Board.

Experiment 7 Design of dedicated Microprocessor using Verilog.

Experiment 8 To study serial communication between FPGA and microcontroller.

Mini Project Design of Digital systems using HDL.

List of Submission

1. Total number of Experiments - 10
2. Project/Dissertation Report- 01

Additional Information

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Design Combinational Circuits using VHDL and Verilog.
2 Design Sequential Circuits using VHDL and Verilog.
3 Implement the Digital Systems on CPLD and FPGA.

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√	√			√					√			√	√
CO2	√	√			√					√				√
CO3		√	√	√	√				√	√			√	

Assessment Pattern

Skill Level (as per CAS Sheet)	**Exp 1**	**Exp 2**	**Exp 3**	**Exp 4**	**Exp 5**	**Exp 6**	**Exp 7**	**Exp 8**	**Exp 9**	**Exp 10**	**Avg**
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
CA											

Government College of Engineering Karad
Final Year B. Tech
EX1707: Fiber Optics Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives:

The student should be able to:

1. Understand Optical fiber structure and light propagating mechanisms in detail
2. Analyze the signal degradation mechanisms and the methods of limiting the same
3. Explain the construction and working of optical sources and detectors
4. Describe the fiber optics link design and optical network in fiber

Course Contents

Experiment 1	Study of Transmission and reception of analog& digital signal using optical fiber communication system.
Experiment 2	Study of numerical aperture
Experiment 3	Calculation of attenuation loss & bending loss in optic fiber link.
Experiment 4	Study of characteristics of LED & LASER.
Experiment 5	Frequency modulation using optic fiber link.
Experiment 6	PC to PC communication by using optical cable
Experiment 7	Frequency modulation by using voice link
Experiment 8	Study of Pulse width modulation using optic fiber
Experiment 9	One experiment based on Simulation
Experiment 10	Case Study in Telecommunication sector like telephone exchange office etc.
Industrial Visit	Industrial visit to nearest fiber optic cable industry or plant and field report on it.

List of Submission

1. Total number of Experiments:10
2. Field Visit Report:01

Additional Information

Course Outcome(CO):

Upon successful completion of this course, the student will be able to:

1 Analyse the basics of Fiber Optics
2 Synthesize the different types of optical fiber structures and light propagating mechanisms.
3 Evaluate the construction of and working of optical sources and detectors
4 Design of optical fiber link & Budget, WDM and optical network in detail

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√	√		√	√	√	√			√				
CO2	√		√		√	√				√			√	
CO3	√	√			√			√		√	√		√	
CO4	√	√	√	√			√		√	√				√

Assessment Pattern

Skill Level (as per CAS Sheet)	**Exp 1**	**Exp 2**	**Exp 3**	**Exp 4**	**Exp 5**	**Exp 6**	**Exp 7**	**Exp 8**	**Exp 9**	**Exp 10**	**Avg**
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
CA											

Government College of Engineering Karad
Final Year B. Tech
EX1708:Computer Communication Networks Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives:

The student should be able to:

1. Study and implementation of networking basics
2. Describe various routing algorithm and congestion control mechanism
3. Comprehend TCP/IP protocols

Course Contents

Experiment 1 Study of networking

Experiment 2 PC Network TCP/IP configuration

Experiment 3 Construction of CAT 5 Ethernet cable (straight/ cross-over)

Experiment 4 Study of LAN

Experiment 5 Simulation and implementation of bit stuffing

Experiment 6 Simulation of CRC

Experiment 7 Configuration of Network topology using Packet Tracer

Experiment 8 Study of stop and wait, Go back N protocol

Experiment 9 Study of Token Bucket algorithm

Experiment 10 Simulation of Distance Vector Routing algorithm

List of Submission

1. Total number of Experiment 10
2. Total number of sheets 10

Additional Information

Course Outcome(CO):

Upon successful completion of this course, the student will be able to:

1. Provide an information about networking concepts
2. Describe various routing algorithm and congestion control mechanism
3. Comprehend TCP/IP protocols

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**N**
CO1	√	√	√		√							√	√	√
CO2	√	√	√	√	√					√		√	√	√
CO3	√	√			√							√		

Assessment Pattern

Skill Level (as per CAS Sheet)	**Exp 1**	**Exp 2**	**Exp 3**	**Exp 4**	**Exp 5**	**Exp 6**	**Exp 7**	**Exp 8**	**Exp 9**	**Exp 10**	**Avg**
Task I	10	10	10	10	10	10	10	10	10	10	
Task II	10	10	10	10	10	10	10	10	10	10	
Task III	05	05	05	05	05	05	05	05	05	05	
CA											

Government College of Engineering Karad
Final Year B. Tech
EX1719: Speech Processing

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives

The student should be able to:

1. Introduce speech production and related parameters of speech.
2. Show the computation and use of techniques such as short-time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
3. Understand different speech modelling procedures such as Markov and their implementation issues.

Course Contents

		Hours
Unit I	**Basic Concepts:** Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – acoustics of speech production; Review of Digital Signal Processing concepts; Short-Time Fourier Transform, Filter-Bank and LPC Methods.	10
Unit II	**Speech Analysis:** Features, Feature Extraction and Pattern Comparison Techniques: Speech distortion measures – mathematical and perceptual – Log Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, Likelihood Distortions, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – Alignment Paths.	10
Unit III	**Speech Modelling:** Hidden Markov Models: Markov Processes, HMMs – Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-estimation, Implementation issues.	8
Unit IV	**Speech Recognition:** Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.	8
Unit V	**Speech Synthesis:** Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub-word units for TTS, intelligibility and naturalness – role of prosody, Applications and present status.	6

Unit VI **Applications:** Data compression, vocoders, speech enhancement, speaker recognition, aids for the speech and hearing impairments. 6

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Model speech production system and describe the fundamentals of speech.
2 Extract and compare different speech parameters.
3 Choose an appropriate statistical speech model for a given application.
4 Design a speech recognition system.
5 Use different speech synthesis techniques.

Text Books

1 Lawrence RabinerandBiing-Hwang Juang, "Fundamentals of Speech Recognition", PTR Prentice Hall, 1st Edition, 2003.
2 Daniel Jurafsky and James H Martin, "Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, 1st Edition, 2001.
3 Frederick Jelinek, "Statistical Methods of Speech Recognition", MIT Press, 1997.

References

1 Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", California Technical Publishing, 1999.
2 Thomas F Quatieri, "Discrete-Time Speech Signal Processing – Principles and Practice", Pearson Education, 2002.
3 Claudio Becchetti and Lucio PrinaRicotti, "Speech Recognition", John Wiley and Sons, 1999.
4 Ben gold and Nelson Morgan, "Speech and audio signal processing", processing and perception of speech and music, Wiley- India Edition, Student Edition, 2006.

Useful Links

1 https://www.youtube.com/watch?v=X_JvfZiGEek&list=PL90C59267A925137D
2 https://www.youtube.com/watch?v=GxkzxTFvhDU

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√				√								√	√
CO2	√	√											√	
CO3	√	√		√										
CO4	√	√	√			√			√		√		√	√
CO5	√	√											√	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√		√	√
Understand			√	√
Apply	√	√	√	√
Analyse	√	√	√	√
Evaluate		√	√	√
Create				√
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1729: Embedded Linux

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives

The student should be able to:

1. Learn the principles of Operating systems.
2. Understand relationship between subsystem of modern operating systems
3. Develop multiprocessor and multi-thread applications
4. Evaluate efficiency aspect of using system resources.

Course Contents

		Hours
Unit I	Introduction: review of computer organization, introduction to popular operating systems like UNIX, Windows, etc., OS structure, system calls, functions of OS, evolution of OSs.	8
Unit II	Computer organization interface: using interrupt handler to pass control between a running program and OS. Concept of a process: states, operations with examples from UNIX (fork, exec) and/or Windows. Process scheduling, Interprocess communication (shared memory and message passing), UNIX signals	8
Unit III	Threads: multithreaded model, scheduler activations, examples of threaded programs. Scheduling: multi-programming and time sharing, scheduling algorithms, multiprocessor scheduling, thread scheduling (examples using POSIX threads)	8
Unit IV	Process synchronization: critical sections, classical two process and n-process solutions, hardware primitives for synchronization, semaphores, monitors, classical problems in synchronization (producer-consumer, readers-writer, dining philosophers, etc.). Deadlocks: modelling, characterization, prevention and avoidance, detection and recovery.	8
Unit V	Memory management: with and without swapping, paging and segmentation, demand paging, virtual memory, page replacement algorithms, working set model, implementations from operating	8

systems such as UNIX, Windows. Current Hardware support for paging: e.g., Pentium/ MIPS processor etc.

Secondary storage and Input/Output: device controllers and device drivers, disks, scheduling algorithms, file systems, directory structure, device controllers and device drivers, disks, disk space management, disk scheduling, NFS, RAID, other devices. operations on them, UNIX FS, UFS protection and security, NFS.

Unit VI Protection and security: Illustrations of security model of UNIX and other OSs. Examples of attacks. 8

Course Outcome (CO)

Upon successful completion of this course, the student will be able to:

1 Describe the basic principles used in design of modern operating system
2 Explain the objective and functions of modern operating systems
3 Compare and Contrast the common algorithms used for both pre-emptive scheduling of tasks in operating systems
4 Evaluate the appropriate design choices when solving real-world problems
5 Analyze the key Trade-off between multiple approaches to operating system design

Text Books

1 Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", 8th Ed., John Wiley, 2008.
2 William Stallings, "Operating Systems: Internals and Design Principles", Prentice-Hall, 6th Ed., 2008.
3 AS Tanenbaum, "Modern Operating Systems", 3rd Ed., Pearson, 2009.

References

1 Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", 8th Ed., John Wiley, 2008.
2 AS Tanenbaum, AS Woodhull, "Operating Systems Design and Implementation", 3rd Ed., Prentice Hall, 2006.
3 M. J. Bach., "Design of the Unix Operating System", Prentice Hall of India, 1986.

Useful Links

1 http://nptel.ac.in/courses/106108101/
2 https://onlinecourses.nptel.ac.in/noc16_cs10/preview

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√	√	√	√		√			√	√	√		√	√
CO2	√	√	√	√	√				√	√				
CO3	√	√	√	√	√			√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√		√					√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√			√
Understand	√	√		√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate		√	√	√
Create		√	√	√
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1739: PLC and SCADA

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Understand PLC & its applications
2. Understand PLC architecture and Ladder Diagram Programming
3. Understand SCADA system and Architecture
4. Understand advance applications of PLC and SCADA

Course Contents

		Hours
Unit I	**Introduction to Programmable logic controllers (PLC)** History of PLC, Ladder diagram fundaments, PLC configuration, System Block Diagram, PLC Input & Outputmodules, central processing unit, CPUs & Programmer/monitors, Solid state memory, theprocessor, Input modules (Interfaces), Power supplies, PLC advantages & disadvantages, Selection criteria for PLC.	8
Unit II	**Programming of PLC** PLC programming – physical components vs. program components, programming of Boolean logic & relay logic, programming of ON/OFF Inputs to produce ON/OFF outputs Advanced programming technique, Mnemonic programming code, Wiring techniques, Analog I/O	8
Unit III	**Advanced PLC Function** Analog PLC operation, PID control of continuous processes, simple closed loop systems, closed loop system using Proportional-Integral & Derivative (PID), PLC interface, control of industrial robots using PLCs, Descriptive automation tools PLC, Hybrid DCS/PLC	8
Unit IV	**SCADA Systems** History, Introduction and definitions of SCADA, Evolution of SCADA, Basic SCADA system Architecture**,** SCADA applications, SCADA system security issue, SCADA system desirable Properties, Real Time System, SCADA server, SCADA functions, modern SCADA systems	8
Unit V	**SCADA Architecture** Monolithic, Distributed, Networked Architecture, Intelligent Electronic Devices, Operation and control of interconnected power	8

system, Automatic substation control, Energy management system, system operating states, system security, State estimation,SCADA Protocols, The Security Implications of the SCADA protocols

Unit VI **Advance Applications of PLC and SCADA**

PLC programming methods as per IEC 61131, PLC applications for batch process using SFC, Analog Control using PLC, PLC interface to SCADA/DCS using communication links (RS232, RS485) and protocols (Modbus ASCII/RTU) 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Analyse the PLC/SCADA and its architecture.
2 Evaluate PLC, its requirements & development of PLC software.
3 Synthesize any advanced system using PLC and can be able to simulate identify and debug the faults.
4 Apply ladder diagram for industrial applications

Text Books

1 Federick D. Hackworth, "Programmable Logic Controllers", Pearson Education, 2004.
2 Frank D.Petruzella, "ProgrammableLogicControllers", MGH publication.
3 Dr. Ramachandran, "Mechatronics", Wiley Pub. (For SCADA).
4 Ronald L. Krutz, "Securing SCADA System", Wiley Publication, 1980.

References

1 Batten G. L., "Programmable Controllers", McGraw Hill Inc., 2nd Edition, 2005.
2 P. K. Srivstava, "Programmable Logic Controllers with Applications", BPB Publications.
3 Stuart A Boyer, "SCADA supervisory control and data acquisition", Bpb Publications, 2004.

Useful Links

1 www.nptelvideos.in/2012/11/industrial-automation-and-control.html
2 nptel.ac.in/courses/112102011/12
3 nptel.ac.in/courses/108106022/8

Mapping of CO and PO

	PO												PSO	
	A	**B**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√				√						√		√	√
CO2	√		√	√	√							√		√
CO3	√	√	√	√			√				√		√	√
CO4	√												√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyse	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1749: Robotics

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Total Credits	4	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Impart the fundamentals of Automation and Robotics.
2. Develop the knowledge of control systems used in Robotics.
3. Understand the basics of Sensors used in Robotics.
4. Understand basic electronic and Mechanical components used in robotics.

Course Contents

		Hours
Unit I	**Fundamentals of Robotics** Automation and robotics, history of Robotics, Degrees of freedom, components of a robot, Classification of Robots, Application of Robotics.	7
Unit II	**Control, Actuation and End Effectors** Basic control systems concepts and models, Types of Controllers, feedback components, Actuators, Power transmission systems, End Effectors, Grippers, Selection and Design Considerations.	8
Unit III	**Sensors** position sensors, Velocity sensors, Accelerometers, Proximity sensors, Touch sensor, Slip sensors, Wrist Sensors, Compliance Sensors, Vision sensors	10
Unit IV	**Interfacing, Machine Vision and Programming** Interfacing of Robot with External world, I/O Ports, Fundamentals of machine vision, Acquiring of Image, analysing of Image, Introduction to robot programming, VAL Programming, Motion Commands, Sensor Commands, End effecter commands, and Simple programs	8
Unit V	**Robot Programming** Introduction to robot programming, VAL Programming, Motion Commands, Sensor Commands, End effecter commands, and Simple programs	7
Unit VI	**Applications of Robotics** Use of robots for material handling, machine loading and unloading,	8

forging, Machining, die casting, spot welding, continuous arc welding, spray coatings and Assembly Operations

Course Outcome (CO):

Upon successful completion of this course, the student will be able to compute:

1 Understand the fundamentals of Automation Robotics.
2 Design control systems for Robotics.
3 Develop feedback systems using sensors for Robot.
4 Understand the Machine Vision and Programming of Robot.

Text Books

1 M.P. Groover, M. Weiss, R.N. Nagel, N.G. Odrey, "Industrial Robotics", Tata Mc-Gra Hills Publication, First Edition, 1986.
2 Thomas R. Kurfess, "Robotics and Automation Handbook", CRC Press, 1st edition, 2004.
3 Yoram Koren, "Robotics for Engineers", McGraw-Hill Book Co., 1st edition, 1992.

References

1 Saeed B. Niku, "Introduction to robotics analysis, control and applications", Willey publication, 2nd edition, 2011.
2 Richard D. Kalfter, "Robotic Engineering: An integrated approach", PHI Publication, 1st edition, 1989.
3 Janakiraman. P.A., "Robotics and Image Processing", Tata McGraw-Hill Publication, 1st edition, 1995.

Useful Links

1 http://nptel.ac.in/courses/112101099
2 https://see.stanford.edu/Course/CS223A
3 https://ocw.mit.edu/courses/mechanical-engineering/2-12-introduction-to-robotics-fall-2005/lecture-notes/

Mapping of CO and PO

	a	b	c	d	e	f	g	h	i	j	k	l	PSO	
													m	n
CO1		✓											✓	
CO2	✓	✓	✓		✓									✓
CO3			✓		✓						✓		✓	✓
CO4	✓		✓										✓	

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	✓	✓	✓	✓
Understand			✓	✓
Apply	✓	✓		✓
Analyze	✓			✓
Evaluate				✓
Create		✓		✓
Total	**15**	**15**	**10**	**60**

Government College of Engineering, Karad
Final Year B. Tech.
EX1805: Project

Practical 2 Hrs/week
Total Credits -
Course Objectives:
The student should be able to:

1 Continue Literature survey and compare different techniques/ methods and find out the optimal one.
2 Implement the optimal method and perform mathematical modelling and evaluate experimental justification.
3 Design a product which can be an embedded system, data acquisition system, control system or it can be service providing system.
4 Learn presentation skills and technical report writing.

Course Contents

The project work will be carried a topic related to the Electronics & Telecommunication Engineering and allied fields. The topic may be from one of the following:

1. Development & implementation of high-end Laboratory set-up in the area of Electronics & Telecommunication Engineering
2. Modification in an existing electronics system.
3. It can be practical need of the industry, which should involve system design aspect.
4. Implementation of innovative work leading to comfort of human life (Interdisciplinary Real- Life Applications).

Evaluation will be based on following criteria:

1. Selection of domain & topic
2. Literature review for last 3 Years to do the gap analysis.
3. Finalization of aim & objectives
4. Finalization of specifications & Features requirement
5. 20% Implementation of proposed project work (Roadmap, Methodology/Algorithms Finalization and design, etc)

Note: Candidate opting for project work in Industry sponsored project will complete all above task with coordination with Industry & Allotted guide (Task No.5 may be option)

Evaluation Scheme:

Evaluation of Project work in Sem-VII will be considered while giving marks for Evaluation in Sem-VIII

Course Outcomes (COs):

At the end of this course, students will be able to

1 Interpret optimal method for solution finding.
2 Assemble, compile, debug and test the hardware and derive the test results.
3 Analyze the product in terms of non-recurring and unit cost, power consumption, performance, market sustainability, flexibility, etc.
4 Create a prototype model of the system.

Mapping of CO and PO

	PO												PSO	
	a	**B**	**C**	**d**	**e**	**f**	**G**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√	√		√										
CO2	√		√									√	√	√
CO3	√			√	√	√	√			√		√	√	
CO4	√		√		√				√					√

Assessment Pattern

Knowledge Level	**CA**	**ESE**
Remember	√	√
Understand	√	√
Apply	√	√
Analyze	√	√
Evaluate	√	√
Create	√	√
Total	**100**	**100**

Government College of Engineering Karad
Final Year B. Tech
EX1801:Advanced Networking

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Know advanced topics in networking, with emphasis on wireless and IP networks
2. Analyse the proposed algorithms and protocols and look for ways to improve them.
3. Acquaint the students with the application of networking.
4. Network security and authentication, and various algorithms related to it has been dealt, to get a practical approach.

Course Contents

		Hours
Unit I	**Review of Basic Concepts and The Internet Layer Protocols** TCP/IP Protocol Suite, Underlying Technologies: LAN (802.3) Wireless Lans (802.11), Point-to-point WANS, Switched WANS Review of IPv4 Protocol, IPv6, Transition from IPv4 to IPv6, ICMPv4, ICMPv6	10
Unit II	**Multimedia and Security** Digitizing Audio and Video, Streaming stored Audio / Video Streaming Live Audio / Video, Real-Time Interactive Audio / Video, RTP, RTCP, Voice Over IP,The need for Security, Security Approaches, Principles of Security, Types of Attacks	10
Unit III	**Cryptography: Concepts and Techniques** Introduction, Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Symmetric and Asymmetric key, cryptography.	8
Unit IV	**Symmetric Key and Asymmetric Key Algorithms** Algorithms types and modes, RSA, Symmetric and Asymmetric key, Cryptography, Digital Signatures.	8
Unit V	**Internet Security Protocols and User Authentication** Secure Socket Layer, TLS, SHTTP, TSP, SET, SSL Verses SET, 3-D Secure Protocol, Electronic Money, Email Security, Firewalls, IP	6

Security, VPN, Passwords, Certificate-based Authentication, Kerberos, and Security Handshake Pitfalls.

Unit VI **Network Security Application**

Electronic Mails Security, IP Security, web Security 6

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Know about different protocols, principles of security.
2 Understand cryptography and its process.
3 Apply different types algorithms.
4 Analyze and apply internet security protocols and authentication protocols.

Text Books

1 Behrouz A. Forouzan, "TCP / IP Protocol Suite", Tata Mc Graw Hill, 4thEdition, 2005.
2 Andrew Tanenbaum, "Computer Networks",Pearson Prentice Hall,4thEdition, 2013.
3 William Stallings,"Cryptography and Network Security",Pearson Prentice Hall,4thEdition, 2006.

References

1 Douglas E. Comer, "Internetworking with TCP/IP", Vol. 2, Design, Implementation and Internals, Prentice Hall Publisher, 2006.
2 Douglas E. Comer, "Client-server Programming and Applications", Prentice Hall Publisher, 1996.
3 Kizza, "Computer Network Security", Springer, 2005.

Useful Links

1 https://technet.microsoft.com
2 http://www.cse.psu.edu
3 https://handouts.secappdev.org

Mapping of CO and PO

	PO												PSO	
	a	**B**	**C**	**d**	**e**	**f**	**g**	**h**	**I**	**J**	**k**	**l**	**m**	**n**
CO1	√	√	√		√							√	√	√
CO2	√			√	√							√		
CO3	√	√	√		√							√	√	
CO4	√	√	√	√	√				√	√		√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1802 Microwave Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Understand microwave components.
2. Design flow of microwave components and their system integration.
3. Understand working principle of microwave sources.
4. Understand measurement of microwave parameters and design MMIC and RFIC

Course Contents

		Hours
Unit I	**Microwave components:** Scattering parameters, microwave cavities, microwave hybrid circuits, directional coupler, circulators and isolators, microwave attenuators, slotted lines, parallel, coplanar & shielded micro strip lines. Power amplifier (Operating principle & S -parameter equations of above mentioned microwave components)	8
Unit II	**MicrowaveTubes:** Linear beam: klystrons, reflex klystrons, TWTs. Microwave Crossed Field Tube: Magnetrons, forward wave crossed field amplifier(FWCFA) and high power gyrotrons (Operating principle, construction & analytical treatment ofmentionedmicrowavetubes)	8
Unit III	**Waveguides:** Rectangular and circular wave guides: TE, TM and TEM modes in waveguides, power transmission in waveguide, power losses in wave guide, excitation modes in wave guide, Characteristics of standard waveguides	8
Unit IV	**MicrowaveSolidStateDevices:** Microwave tunnel diodes, microwave FETs, Gunn effect diodes, RWH Theory, LSA diodes, InP diodes, Impatt diodes, PIN diodes, ruby laser, MESFETs and HEMT (Operating principle, construction & analytical treatment of above mentioned microwave devices)	8

Unit V **MicrowaveMeasurements**

Detection of microwave power: measurement of microwave power bridge circuit, thermister parameters, waveguide thermister mounts, theory of operation of barraters, direct reading barreters bridges, Measurement of wavelengths: single line cavity coupling system, frequency pulling by reactive load, Transmission cavity wave meter & reaction wave meter, measurement of VSWR, measurements of attenuation, free space attenuation, conversion of transmitting and receiving power to electric field intensity, conversion of receiving intensity voltage to electric field 8

Unit VI **MMIC And Microwave components design steps**

Materials: substrate, conductor dielectric & resistive MMIC growth, thin film formation, hybrid microwave I.C. fabrication Microwave hazards. Design and development of: power Amplifier, LNA, Power combiner/divider, directional coupler. 8

Course Outcome (CO):

1 To learn structure of microwave components and system integration
2 Analysis of system interconnections within microwave T-R module
3 To understand behaviour of microwave source, amplifier, oscillator
4 Microwave and their measurement

Text Books

1 SamulLiao, "MicrowaveDevicesandCircuit", PrenticehallofIndia, 1997.
2 David M.Pozer., "MicrowaveEngineering",WileyPublications, 3rd Edition, 2009.

References

1 R.E.Collin, "Foundation for Microwave Engineering", Wiley Publications.
2 AnnapurnaDas, "MicrowaveEngineering", TMHPublications, 2nd Edition, 2009.

Useful Links

1 https://www.microwaves101.com/

Mapping of CO and PO

	PO												PSO	
	a	**B**	**C**	**d**	**e**	**f**	**g**	**h**	**I**	**J**	**k**	**l**	**m**	**n**
CO1	√	√	√	√										
CO2	√	√		√										
CO3	√													
CO4		√	√	√										

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1814: Broadband Communication

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Understand Broadband communication and high-speed networks.
2. Describe broadband network architecture and data transmission.
3. Understand B- ISDN Services and protocols.
4. Know the concepts of Broadband Access Network topologies and Broadband Backbone network design.

Course Contents

		Hours
Unit I	**Basics of Broadband Communication** Telecommunication network-Switching technologies-Need for broadband communication-overview of broadband technologies-Evolution of B-ISDN, Computer communication network.	8
Unit II	**B-ISDN Architecture and Standards, B-ISDN Services** Conversational, Messaging, Retrieval, Distribution, Business and Residential requirements.	7
Unit III	**B-ISDN Protocols** User plane, Control plane, Physical layer, Line coding, Transmission structure, SONET Requirement, Signal Hierarchy, System Hierarchy.	8
Unit IV	**Broadband ATM Switching and Transmission** ATM Based broadband switching overview - ATM Based switching - ATM Based switching principle - ATM Switching requirements - ATM Switch building blocks - ATM switching matrix or network – ATM Cell Processing in a switch – Broadband Transmission, Functional components, functions – Broadband network architecture.	9
Unit V	**Broadband Network Design** Broad band Access network Design-Requirements, and Broadband Access Network topologies. Broadband Backbone Network design requirements - Broadband	8

Backbone Network Design.

Unit VI **Wireless Broadband**

Introduction to broadband wireless, Evolution of broadband wireless, Fixed and mobile broadband wireless, Wimax and Other Broadband wireless technologies an overview. 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Creating broadband and wireless networks
2 Evaluating Different High-speed networks supporting B-ISDN.
3 Applying the appropriate network architecture and switching principle.
4 Understanding the broadband communication over a network.

Text Books

1 William Stallings " ISDN and Broadband ISDN with Frame Relay and ATM", Prentice-Hall, 4th Edition,1999.
2 Balaji Kumar," A professional guide to ATM, Frame relay, SMDS, SONET,B-ISDN", Tata McGraw-Hill Publications.
3 John R Vacca, "Wireless Broadband Networks Handbook", Tata McGrawHill,1st Edition, 2001.

References

1 Robert C Newman, "Broadband Communications", Prentice Hall,1st Edition,2002.
2 Simon Haykin, "Communication Systems", John Wiley & sons,4th Edition,2001.
3 Jeffrey G. Andrews, Arunabha Ghosh & Rias Muhamed, "Fundamentals of WiMAX: Understanding Broadband Wireless Networking", Prentice Hall,1st Edition, 2007.

Useful Links

1 http://www.nptelvideos.in/2012/12/broadband-networks.html
2 http://nptel.ac.in/downloads/117105076/
3 http://nptel.ac.in/courses/117102062/
4 http://nptel.ac.in/syllabus/117104099/
5 http://nptel.ac.in/courses/117102062/36

Mapping of CO and PO

	PO												**PSO**	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√		√					√						
CO2	√			√	√						√	√		
CO3	√	√	√	√	√			√			√	√	√	√
CO4	√	√				√	√	√	√		√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1824: Satellite Communication

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Describe the fundamental concept in the field of satellite communication.
2. know how to place satellite in orbit.
3. design the satellite power budget.
4. Understand and evaluate satellite subsystem which used in Space segment.

Course Contents

		Hours
Unit I	**Basic Principles** General features, frequency allocation for satellite services, basic concept of satellite communication **Earth Station:** Introduction, earth station subsystem, different types of earth stations	7
Unit II	**Satellite Orbits** Orbital Mechanics, Look angle determination, Orbital perturbation, Orbital determination, Launchers and Launch vehicles, Orbital effects in communication system performance.	8
Unit III	**Satellite Subsystem (Space Segment)** Satellite Subsystem, Attitude and control system(AOCS),Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas, Equipment reliability and space qualification.	8
Unit IV	**Satellite** L**inks** Introduction, general link design equation, system noise temperature, uplink design, downlink design, complete link design, Design of specified C/N: Combining C/N and C/I value in Satellite Links.	8
Unit V	**Satellite Networks** Reference architecture for satellite networks, basic characteristics of satellite networks, Onboard connectivity with transparent processing, analogue transparent switching, Frame organization, Window organization, On board connectivity with beam scanning	9

Unit VI **The Role and Application of Satellite Communication**

C-Band and Ku- Band Home satellite TV, Digital DBS TV, Satellite Radio Broadcasting, Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and codes. 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Understanding Orbital aspects involved in satellite communication.
2 Creating of Power budget link and satellite networks using different topologies and switching concepts.
3 Remembering Satellite system and services provided.
4 Evaluating the performance satellite communication system and know application of satellite communication.

Text Books

1 Timothy Pratt, Charles W. Bostian, "Satellite Communications ", John Wiley & Son, 2nd Edition, 2003.
2 Dennis Roddy, "Satellite Communications", McGraw-Hill International,3rd Edition, 2001.
3 Anil k. Maine and Varsha Agaraval, "Satellite Communications",Wiley Publications,1st Edition,2010.

References

1 Gerard Maral and Michel Bousquet, "Satellite Communication",Wiley Publication,5th Edition,2009.
2 Wilbur L. Prichard, Henry G. Suyerhood, Ropert A. Nelson, "Satellite Communication System Engineering", Pearson education,2nd Edition, 2003.
3 Robert Gagliardi, "Satellite Communication", CBS Publication,1st Edition,2004.
4 M. Richaria, “Satellite Communication Systems Design Principles”, Pearson Publications 2nd Edition,1999.

Useful Links

1 http://www.satellitetoday.com
2 http://www.hughespace.com
3 http://nptel.ac.in/courses/117105131/
4 https://www.coursera.org/learn/satellite-communications
5 http://www.dtic.mil/dtic/tr/fulltext/u2/746165.pdf

Mapping of CO and PO

	PO												PSO	
	a	**B**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√	√			√		√							
CO2	√	√		√	√			√					√	√
CO3	√	√	√				√	√	√	√			√	√
CO4	√		√			√	√					√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1834: Audio & Video Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE:	2 Hrs 30 min

Course Objectives:

The student should be able to:

1. Study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver, Picture Tubes and Television Camera Tubes.
2. Study the various Colour Television systems with a greater emphasis on television standards.
3. Know the advanced topics in Digital Television and High Definition Television
4. Know audio recording systems such CD/DVD recording, Audio Standards, and Acoustics principles and video conferencing.

Course Contents

		Hours
Unit I	**Fundamentals of television system** Picture and sound transmission and reception, aspect ratio, horizontal and vertical resolution, video bandwidth and interlaced scanning, composite video, signal, H & V sync details, CCIR-B standards, VSB transmission and channel bandwidth, chromaticity diagram.	7
Unit II	**Color signal transmission and reception** Color TV camera, Color Picture Tubes, picture tubes, purity & convergence, automatic degaussing, Composite color signals, compatibility considerations, frequency interleaving process, color mixing theory, characteristics of color, color difference signals,color TV system: NTSC, PAL – D & SECAM.	8
Unit III	**Digital Television** Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameter, MAC signals, advanced MAC signal transmission, Digital TV receivers, NTSC, DTV, MPEG 2, JPEG 4 MAC production tools, Digital compression techniques, H. and G. standards, digital TV recording techniques/ broadcasting.	9
Unit IV	**Audio processing** Methods of sound recording and reproduction, optical magnetic	9

recording, CD recording, CD DVD player, MP3 player, MPEG audio standards. Studio Acoustics chamber, reverberation, PA system for auditorium, Acoustics chamber cordless microphone systems, special type of speakers/ cell phones.

Unit V **Digital video system**

Video conferencing, Interactive video and multimedia, Videophone, 3D TV. 6

Unit VI **Advanced TV systems**

LCD TV System:LCD Technology, LCD Matrix types &operations , Plasma TV System : Plasma & conduction of charge, Plasma TV screen ,Signal processing in Plasma TV, Plasma colour Receiver, LED TV, DTH Receiver System ,CCTV,OLED TV working of block converter, IR Remote control. 8

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Understand the working of real life video system and the different elements of video system plus the encoding/decoding techniques.
2 Evaluate different channel allocations, difference between various systems present in this world, their transmission and reception techniques.
3 Analyze different standards of compression, insight on functioning of individual blocks, and they will be acquainted with different types of analog, digital TV and HDTV systems.
4 Describe of fundamentals of Audio systems, basics Acoustics and Video conferencing.

Text Books

1 A.M. Dhake,“Television and Video Engg”, TMH publication,2nd Edition,2003.
2 R. G. Gupta,“Audio Video systems”, Technical Education,1st Edition,2006.
3 S.P. Bali, “Color Television Theory and Practice”, TMH,3rd Edition, 1994.

References

1 R.R. Gulati, “Modern Television Practice-Principles”,Technology and service New Age International publication, 3rd Edition,2006.
2 R.R. Gulati, “Monochrome and Color TV”, New Age International Publication,2nd Edition, 2002.
3 B.Grob, C.E.Herndon, “Basic Television and Video Systems”, Mc Graw Hill, 2nd Edition,1999.

Useful Links

1 http://nptel.ac.in/downloads/117105083/
2 http://nptel.ac.in/courses/106105082/38
3 http://nptel.ac.in/syllabus/117106103/

Mapping of CO and PO

	PO												PSO	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**N**
CO1	√	√	√		√	√	√					√	√	√
CO2	√	√		√	√	√		√						
CO3	√	√	√	√	√	√		√				√		√
CO4	√	√					√							

Assessment Pattern

Knowledge Level	**CT1**	**CT2**	**TA**	**ESE**
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1844: Digital Signal Compression

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Total Credits	3	**CT2**	15
		TA	10
		ESE	60
		Duration of ESE: 2 Hrs 30 min	

Course Objectives:

The student should be able to:

1. Classify and understand the concept of compression and coding techniques.
2. Identify and understand use of predictive approach and transform techniques.
3. Understand how to apply of compression techniques on image, audio and video data.
4. Identify different standards for image, audio and video compressions.

Course Contents

		Hours
Unit I	**Introduction to Data Compression:** Data compression problems, Lossless and lossy compression, Measure of compression quality, Limits on lossless compression, modelling and coding, different types of models, and coding techniques.	6
Unit II	**Text Compression:** Minimum variance Huffman coding, extended Huffman coding, Adaptive Huffman coding. Arithmetic coding, Dictionary coding techniques,LZ 77, LZ 78, LZW	6
Unit III	**Predictions and Transforms:** Predictive approach, Move to Front coding, Burrows-Wheeler transform (BWT), Transform Approach, Discrete cosine transform (DCT), Sub band coding, wavelet transforms.	6
Unit IV	**Audio Compression:** Modelling Sound, Sampling- Nyquist frequency, Quantisation- Scalar, Uniform and Non-uniform. Compression Performance, Speech Compression- Speech coders, Predictive approaches, Silence compression, Pulse code modulation (ADPCM). Music compression- Streaming audio, MIDI.	10
Unit V	**Image Compression:** Image compression using DCT, zig-zag scanning, still image compression standard - baseline JPEG, Color Image Processing: Colormodels - RGB, CMY, YIQ, HIS, Pseudo –coloring.	10

Unit VI **Video Compression:**

Analogue video, Digital video, Moving pictures, MPEG, Basic principles, Temporal compression, algorithms, Group of Pictures, Motion estimation, Work in different video formats. 10

Course Outcome (CO):

Upon successful completion of this course, the student will be able to:

1 Apply lossy and lossless compression techniques.
2 Design and implement audio compression system using techniques like Silence Compression, Adaptive Differential Pulse Code Modulation (ADPCM) and Linear Predictive Coding (LPC).
3 Design and implement image compression system using JPEG standard.
4 Design and implement video compression system using MPEG standard.

Text Books

1 Ida Mengyi Pu, "Fundamental Data Compresiion", Butterworth-Heinemann, 2006
2 K. Sayood, "Introduction to Data Compression", Harcourt India Pvt. Ltd. & Morgan Kaufmann Publishers, 1996.

References

1 N. Jayant and P. Noll, "Digital Coding of Waveforms: Principles and Applications to Speech and Video", Prentice Hall, USA, 1984.
2 D. Salomon, "Data Compression: The Complete Reference", Springer, 2000.
3 Z. Li and M.S. Drew, "Fundamentals of Multimedia", Pearson Education (Asia) Pte. Ltd., 2004.

Useful Links

1 https://www.youtube.com/watch?v=5wRPin4oxCo&spfreload=5
2 https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-050j-information-and-entropy-spring-2008/videos-homework-and-readings/
3 https://www.youtube.com/watch?v=rC16fhvXZOo

Mapping of CO and PO

	PO												PSO	
	a	**b**	**C**	**d**	**e**	**f**	**g**	**h**	**i**	**J**	**k**	**l**	**m**	**n**
CO1	√				√									
CO2	√	√	√		√				√			√	√	√
CO3	√	√	√		√				√			√	√	√
CO4	√	√	√		√				√			√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	√	√	√	√
Understand	√	√	√	√
Apply	√	√	√	√
Analyze	√	√	√	√
Evaluate	√	√	√	√
Create				
Total	15	15	10	60

Government College of Engineering Karad
Final Year B. Tech
EX1806: Microwave Engineering Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	50
Total Credits	1	**ESE**	50

Course Objectives:

The student should be able to:

1. Learn S characteristics of microwave components and devices.
2. Calculate power Budget analysis of microwave system integration.
3. Calculation of various microwave parameters.
4. Explain different microwave hazards.

Course Contents

Experiment 1 Study of V-I characteristics of GUNN diode

Experiment 2 To determine the standing wave ration and reflection coefficient.

Experiment 3 To study the ATTENUATOR (fixed and variable type).

Experiment 4 To study the X-band Microwave circulator.

Experiment 5 To determine isolations, coupling coefficients and input VSWR's for E and H plane waveguide Tee and Magic Tee junctions.

Experiment 6 Study of Directional Coupler and Magic Tee.

Experiment 7 To study the characteristics of the Klystron tube and to determine its Electronic tuning range.

Experiment 8 To study the characteristics of the Reflex Klystron tube and to determine its Electronic tuning range.

Experiment 9 To determine the frequency & wavelength in a rectangular waveguide working in TE10 Mode.

List of Submission

1. Total number of Experiments 9

Additional Information

Course Outcome(CO):

Upon successful completion of this course, the student will be able to:

1 Learn Microwave system integration at different power levels
2 Learn S characteristics of microwave components
3 Microwave parameter measurement
4 Microwave Power budget analysis

Mapping of CO and PO

	PO												PSO	
	a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	✓	✓	✓											
CO2		✓	✓	✓										
CO3	✓	✓		✓										
CO4	✓	✓	✓											

Assessment Pattern

Skill Level (as per CAS Sheet)	**Exp 1**	**Exp 2**	**Exp 3**	**Exp 4**	**Exp 5**	**Exp 6**	**Exp 7**	**Exp 8**	**Exp 9**	**Exp 10**	**Avg**
Task I	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	
CA											

Government College of Engineering, Karad
Final Year B. Tech.
EX1805: Project (Regular Mode)

		Examination Scheme	
Practical	8 Hrs/week	**TA**	100
Total Credits	14	**ESE**	100

Course Objectives:

The student should be able to:

1. Continue Literature survey and compare different techniques/ methods and find out the optimal one.
2. Implement the optimal method and perform mathematical modeling and evaluate experimental justification.
3. Design a product which can be an embedded system, data acquisition system, control system or it can be service providing system.
4. Learn presentation skills and technical report writing.

Course Contents

ESE shall consist of an oral examination based on the report submitted by the candidates and or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners consisting of preferably the guide working as a senior and other external examiner preferably from Industry or the university.

Continuous assessment & Evaluation will be based on following criteria:

I. Selection of domain & topic, Literature review for last 3 Years, Finalization of aim & objectives, Finalization of specifications & Features requirement, 20% Implementation of proposed project work (Roadmap, Methodology/Algorithms Finalization and design, etc)
II. Innovative idea/Innovative concepts/New Ideas incorporated in the project work
III. Cutting edge software ,hardware tools used for the project work
IV. Percentage of implementation/completion of project work (100% Completion is expected)
V. Research publication on project work. (Survey paper, proof of concept, innovative idea of project, implementation of project, etc.)

Note: Hardcopy of project diary should be maintained GroupWise, where report of every week activity should be maintained, which should be presented at the time of examination

Course Outcomes (COs):

At the end of this course, students will be able to

1. Interpret optimal method for solution finding.
2. Assemble, compile, debug and test the hardware and derive the test results.

3 Analyze the product in terms of non-recurring and unit cost, power consumption, performance, market sustainability, flexibility, etc.
4 Create a prototype model of the system.

Mapping of CO and PO

	PO												PSO	
	a	**B**	**c**	**d**	**e**	**f**	**G**	**h**	**i**	**j**	**k**	**l**	**m**	**n**
CO1	√	√		√										
CO2	√		√									√	√	√
CO3	√			√	√	√	√			√		√	√	
CO4	√		√		√				√					√

Assessment Pattern

Knowledge Level	**CA**	**ESE**
Remember	√	√
Understand	√	√
Apply	√	√
Analyze	√	√
Evaluate	√	√
Create	√	√
Total	**100**	**100**

Government College of Engineering, Karad
Final Year B. Tech.
EX1807: Project (Industry Mode)

		Examination Scheme	
Practical	--	**TA**	150
Total Credits	15	**ESE**	150

Course Objectives:

The student should be able to:

1. Continue Literature survey and compare different techniques/ methods and find out the optimal one.
2. Implement the optimal method and perform mathematical modeling and evaluate experimental justification.
3. Design a product which can be an embedded system, data acquisition system, control system or it can be service providing system.
4. Learn presentation skills and technical report writing.

Course Contents

ESE shall consist of an oral examination based on the report submitted by the candidates and or the demonstration of the fabricated design project. The said examination will be conducted by a panel of two examiners consisting of preferably the guide working as a senior and other external examiner preferably from Industry or the university.

Continuous assessment & Evaluation will be based on following criteria:

I. Selection of domain & topic, Literature review for last 3 Years, Finalization of aim & objectives, Finalization of specifications & Features requirement,20% Implementation of proposed project work (Roadmap, Methodology/Algorithms Finalization and design, etc)
II. Innovative idea/Innovative concepts/New Ideas incorporated in the project work
III. Cutting edge software ,hardware tools used for the project work
IV. Percentage of implementation/completion of project work (100% Completion is expected)
V. Research publication on project work. (Survey paper, proof of concept, innovative idea of project, implementation of project, etc.)

Evaluation Rubric parameters stated above will be examined in coordination with project guide, Head of the department & sponsoring Industry. For this purpose monthly reporting along with dually sign report from industry about work carried by the candidate need to be presented in the department every month

Note: Hardcopy of project diary should be maintained GroupWise, where report of every week activity should be maintained, which should be presented at the time of examination

Course Outcomes (COs):

At the end of this course, students will be able to

1 Interpret optimal method for solution finding.
2 Assemble, compile, debug and test the hardware and derive the test results.
3 Analyze the product in terms of non-recurring and unit cost, power consumption, performance, market sustainability, flexibility, etc.
4 Create a prototype model of the system.

Mapping of CO and PO

	PO												PSO	
	a	**B**	**c**	**d**	**e**	**f**	**G**	**h**	**I**	**j**	**k**	**l**	**m**	**n**
CO1	√	√		√										
CO2	√		√									√	√	√
CO3	√			√	√	√	√			√		√	√	
CO4	√		√		√				√					√

Assessment Pattern

Knowledge Level	**CA**	**ESE**
Remember	√	√
Understand	√	√
Apply	√	√
Analyze	√	√
Evaluate	√	√
Create	√	√
Total	**100**	**100**